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(54) Shoulder endoprosthesis for fractures of the upper end of the humerus

(57) A shoulder endoprosthesis for fractures of the upper end of the humerus, comprising a humeral stem (15), adapted to be accommodated in an intramedullary canal of the humerus (11) and provided with multiple longitudinal ribs (18), and a humeral proximal part (16), which is suitable to couple to one end of the stem (15), is provided with a plurality of lateral fins (23) and has, at an upper end, a portion (20) for engagement with a humeral head (17) which is suitable to reconstruct the head of the humerus (11) of the patient.

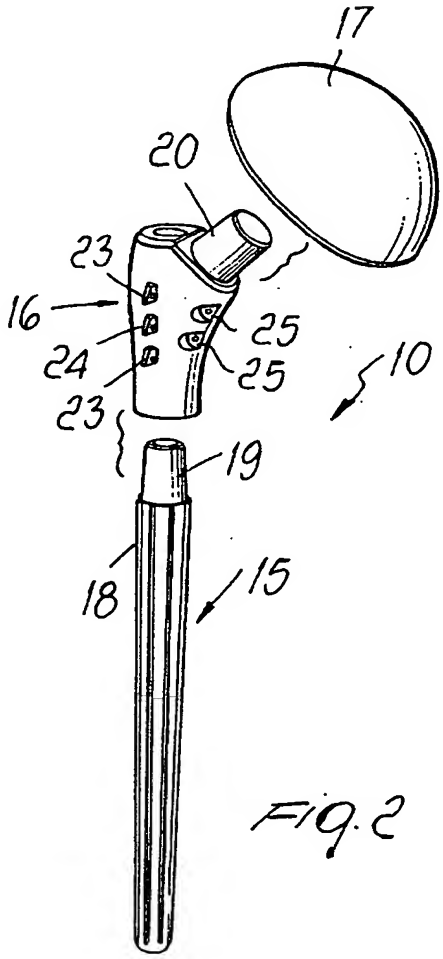

Fig. 2

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Description

[0001] The present invention relates to a shoulder endoprosthesis for fractures of the upper end of the humerus.

[0002] It is known that among the various kinds of fracture of the upper end of the humerus four-part fractures are the most severe and often require surgical treatment when the fragments of the fracture are mutually dislocated.

[0003] In a four-part fracture the muscles play a key role in the pathophysiology of this type of fracture, since they pull in different directions on each fragment of the fracture. As shown in Figure 1, the diaphysis 1, the fragments of the inferior tuberosity 2, the upper tuberosity 3 and the humeral head 4 are separated one another and the fracture is not simple. Conservative treatment by surgical reduction is not satisfactory and very often causes pseudarthrosis or necrosis of the humeral head.

[0004] Accordingly, in these cases the only possible treatment that allows to recover complete mobility and eliminate pain is joint replacement.

[0005] Most surgical procedures that use shoulder joint prostheses are the consequence of fractures.

[0006] Currently known shoulder prostheses are mainly cemented and have holes in the proximal-lateral part in order to allow fixation of the tuberosities. However, the location of said holes makes it difficult to achieve stable fixation of the tuberosities; accordingly, fragment consolidation is often not achieved and patients complain of continuous pain and unsatisfactory mobility of the joint.

[0007] With most of the currently known shoulder prostheses, once the cement has set it is not possible to correct retroversion and therefore position the prosthesis appropriately.

[0008] The aim of the present invention is to provide a shoulder endoprosthesis which can be applied in the case of multiple fractures without requiring bone cement.

[0009] Within the scope of this aim, an object of the present invention is to provide a shoulder endoprosthesis which allows to restore humeral length and correct retroversion.

[0010] Another object of the present invention is to provide a shoulder endoprosthesis which allows to fix the tuberosities to the diaphysis as well as to the prosthesis.

[0011] Another object of the present invention is to provide a shoulder endoprosthesis which allows to reposition the tuberosities with the correct tension and in the correct seat.

[0012] Another object of the present invention is to provide a shoulder endoprosthesis which is highly reliable, relatively easy to manufacture and at competitive costs.

[0013] This aim and these and other objects which will become better apparent hereinafter are achieved by a shoulder endoprosthesis for fractures of the upper end of the humerus, characterized in that it comprises a humeral stem, which is suitable to be accommodated in an intramedullary canal of the humerus and is provided with multiple longitudinal ribs, and a humeral proximal part, which is suitable to couple to one end of said stem, is provided with multiple lateral fins and has, at an upper end, a portion for engagement with a humeral head which is suitable to reconstruct the head of the humerus of the patient.

[0014] Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the shoulder endoprosthesis according to the present invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a four-part fracture of the upper end of the humerus;
Figure 2 is an exploded view of the shoulder endoprosthesis according to the present invention;
Figure 3 is a front view of the humeral proximal part that constitutes one of the components of the endoprosthesis shown in Figure 2;
Figure 4 is a plan view of the humeral stem, accommodated in the intramedullary canal of the humerus;
Figure 5 is a schematic view of the insertion of the endoprosthesis according to the invention in the humerus; and
Figure 6 is a view of a second embodiment of the humeral head which constitutes a component of the endoprosthesis according to the present invention.

[0015] With reference to the figures, and particularly to Figures 2 to 6, the endoprosthesis according to the present invention, generally designated by the reference numeral 10, comprises a humeral stem 15 designed to be inserted in the intramedullary canal of the humerus, which is designated by the reference numeral 11 in Figures 4 and 5.

[0016] The second component of the endoprosthesis according to the invention is constituted by the humeral proximal part 16, designed to couple to the humeral stem 15 at one end and to a humeral head 17 at the opposite end. The humeral head 17 constitutes the third component of the endoprosthesis 10 and is conveniently constituted, for example, by a spherical portion.

[0017] In detail, the humeral stem 15 is a conical tubular element which has, on its lateral surface, longitudinal ribs 18 which are suitable to penetrate for a few tenths of a millimeter in the cortex of the humerus 11, ensuring excellent primary and secondary stability against rotation.

[0018] Conveniently, the humeral stem 15 is made for example of titanium alloy and tapers gently with a total angle of for example 2°.

[0019] Figure 4 is a plan view of the insertion of the

humeral stem 15 in the intramedullary canal of the humerus 11, with the longitudinal ribs 18 which engage the internal surface of the intramedullary canal of the humerus 11, allowing stable fixation of the humeral stem 15.

[0020] The second component of the endoprosthesis according to the invention, i.e., the humeral proximal portion 16, which is also for example made of titanium alloy, can be provided in different sizes, each having a different length.

[0021] The humeral proximal portion 16 is formed by a body which is shaped so as to engage, at one end, the conical end portion 19 of the humeral stem 15, and has, at the opposite end, a protruding conical portion 20 which is suitable to engage an appropriately provided seat 21 formed in the humeral head 17.

[0022] Conveniently, the conical portion 20 is angled with respect to the axis of the proximal part 16 and therefore of the stem 15.

[0023] Preferably, the angle of the conical portion 20 is approximately 135°.

[0024] The lateral surface of the proximal part 16 has a plurality of fins 23 which are suitable to allow fixation of the tuberosities in the bone in order to afford stable anchoring.

[0025] The fins 23 have holes 24 which allow to fix wires to the tuberosities.

[0026] Additional holes 25 for anchoring wires to the tuberosities are further provided in the anterior portion of the proximal part 16.

[0027] The holes 25 are through holes, as shown in the front view of Figure 3.

[0028] The seat 21 formed in the humeral head 17 and suitable to allow the engagement of the conical portion or neck 20 can be conveniently provided with an axis which is inclined with respect to the axis of symmetry 32 of the humeral head 17.

[0029] In this case, the axis of the seat designated by the reference numeral 31 is substantially inclined with respect to the axis of symmetry 32. This allows better adaptation of the humeral head 17 to the anatomy of the proximal epiphysis.

[0030] Figure 6 illustrates two different inclinations of the axis 31.

[0031] Essentially, the anchoring of the prosthesis according to the invention to the humerus is very simple, since it does not require the use of bone cement, and allows to fix the two tuberosities by using wires.

[0032] The humeral stem 15 is further inserted in the intramedullary canal of the humerus 11, also without using bone cement, and the longitudinal ribs 18 allow its stable anchoring.

[0033] In practice it has been observed that the shoulder endoprosthesis according to the invention fully achieves the intended aim, since it allows to reduce the fracture and restore joint function with a fully natural anchoring to the bone.

[0034] The endoprosthesis according to the invention is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept. All the details may furthermore be replaced with other technically equivalent elements.

[0035] In practice, the materials employed, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0036] The disclosures in Italian Patent Application No. MI2000A000122 from which this application claims priority are incorporated herein by reference.

[0037] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A shoulder endoprosthesis (10) for fractures of the upper end of the humerus (11), characterized in that it comprises a humeral stem (15), which is suitable to be accommodated in an intramedullary canal of the humerus (11) and is provided with multiple longitudinal ribs (18), and a humeral proximal part (16), which is suitable to couple to one end of said stem (15), is provided with a plurality of lateral fins (23) and has, at an upper end, a portion (20) for engagement with a humeral head (17) which is suitable to reconstruct the head of the humerus (11) of the patient.

2. The endoprosthesis according to claim 1, characterized in that said humeral stem (15) is constituted by a conical tubular element, said plurality of longitudinal ribs (18) being formed on an outer surface of said stem (15).

3. The endoprosthesis according to claim 1, characterized in that said humeral proximal part (16) has multiple through holes (25) arranged in an anterior region thereof.

4. The endoprosthesis according to claim 1, characterized in that said plurality of lateral fins (23) of said humeral proximal part (16) are each provided with a hole (24).

5. The endoprosthesis according to claim 1, characterized in that said portion (20) for the engagement of said humeral proximal part (16) with said humeral head (17) is frustum-shaped and angled with respect to an axis of simmetry (32) of said humeral head (17).

6. The endoprosthesis according to claim 5, characterized in that said humeral head (17) is a spherical portion inside which there is, at a center, a seat (21) for engagement with said humeral proximal part (16).

7. The endoprosthesis according to claim 6, characterized in that said seat (21) has an axis (31) which is substantially inclined with respect to the diametrical axis of symmetry (32) of said spherical portion (17).

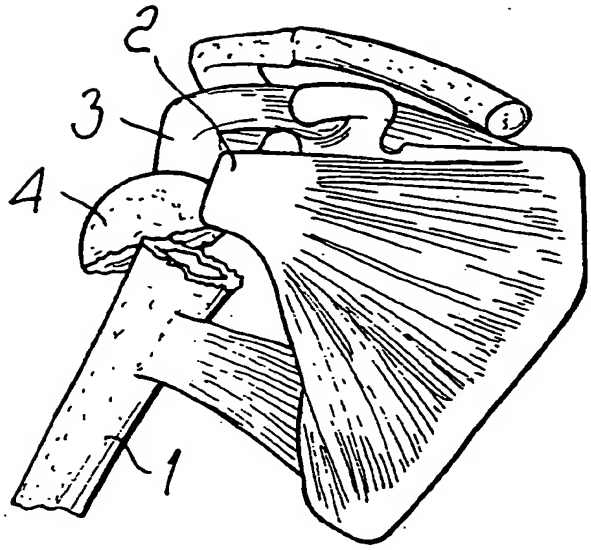

Fig. 1

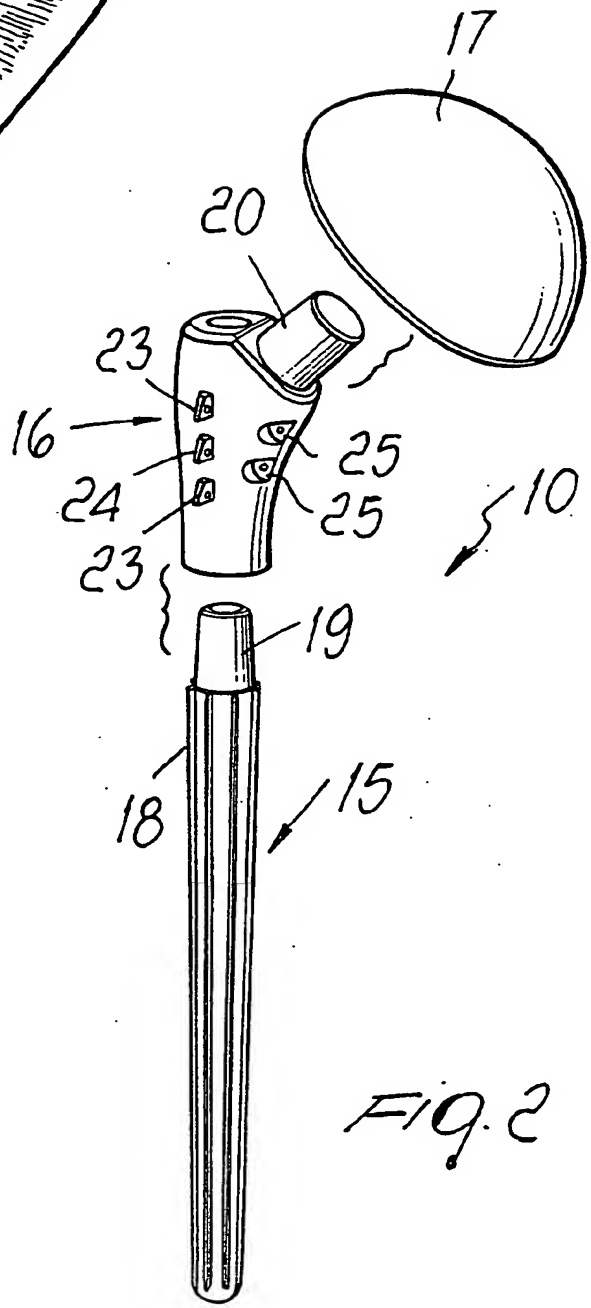

Fig. 2

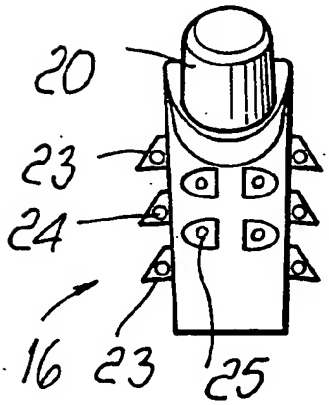

Fig. 3

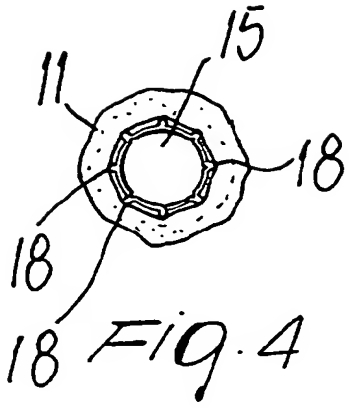

FIG. 4

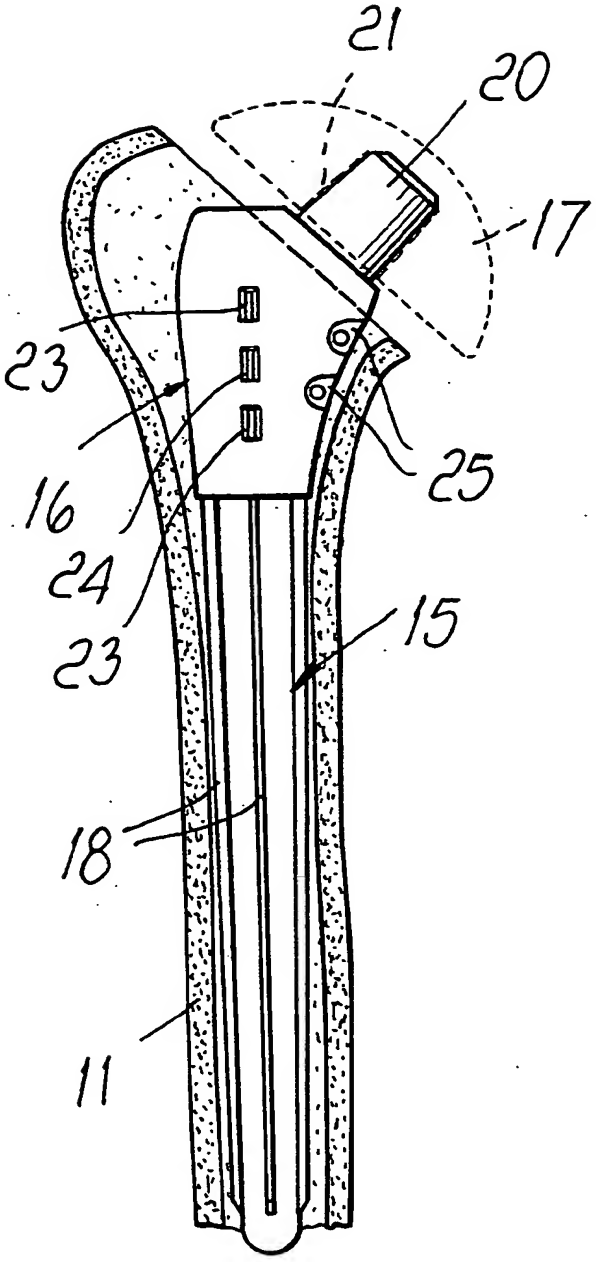

FIG. 5

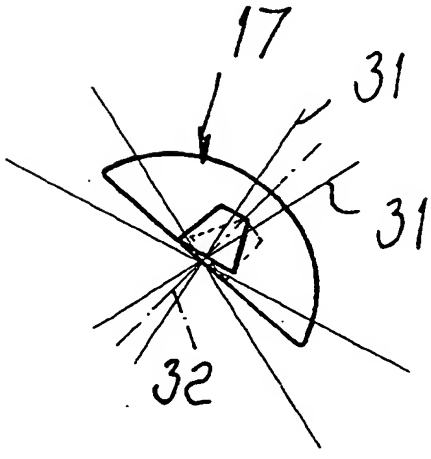

FIG. 6

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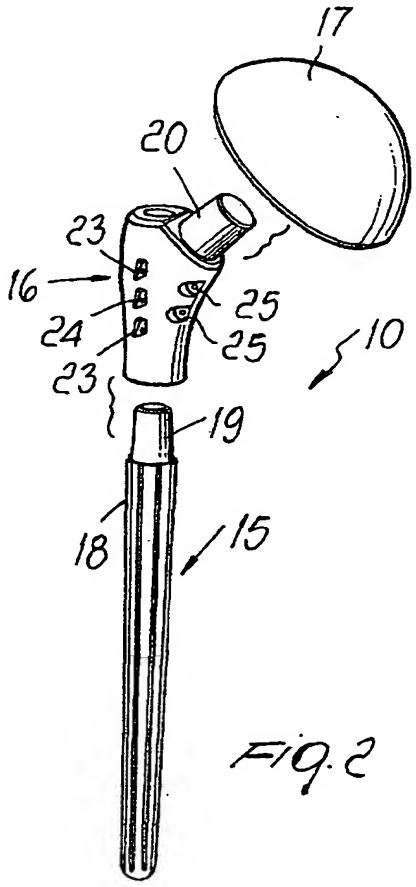

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 0105

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	23 May 2002	Lickel, A

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